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Abstract

THE THERMAL METHOD OF VITRIFICATION OF THE RADIOACTIVE PULPS AND THE SAFE DISPOSAL PROBLEM OF VITREOUS PREPARATIONS

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The present report discusses the problem of a continuous thermal treatment process for radioactive pulps containing the metal hydroxide mixture into vitreous preparations and the conditions of safe disposal of these preparations. The report describes the process physico-chemical principles and bases the use of a "fluidized bed" of quartz sand for dehydrati on of the above mentioned pulps and calcination of their solid residue.

The principal plant flow diagram is described and the main results of its testing on the pilot plant are given. The pilot plant consisted of the following components.

1. The high-efficiency apparatus with a "fluidized bed"
2. The continuous melting apparatus fitted with proportioning devices for slurry feeding and the bottom feeder for loading the melt into containers.

The studying of the radiation stability of vitreous preparations has shown that surface destruction occurred during the irradiation. It leads to the increased solubility of the preparations and to the formation of the mechanically undurable and radiation instable products on the surrace.

It was found that the destruction of the surface was caused by the radiation chemical reactions of the components of fused preparations with the air components.

The process rate decreases on increasing the temperature as

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the gas adsorption on the surface of the preparations decreases and the annealing of radiation defects takes place.

The more simple storage constructions for the high-active vitreous preparations as compared to the storages for the liquid and the other types of solid wastes have been proposed on the basis of complex investigations of properties of vitreous preparations.

The optimum temperature of ground disposal about 700°K during the first period of storage is recommended on the basis of experiments with real vitreous preparations (sp.ac. 2-10 10^3 Cu/l) and electrical modelling with simulated preparations as well as on the basis of thermophysical calculations.

The storage dimensions and arrangement are specially defined.